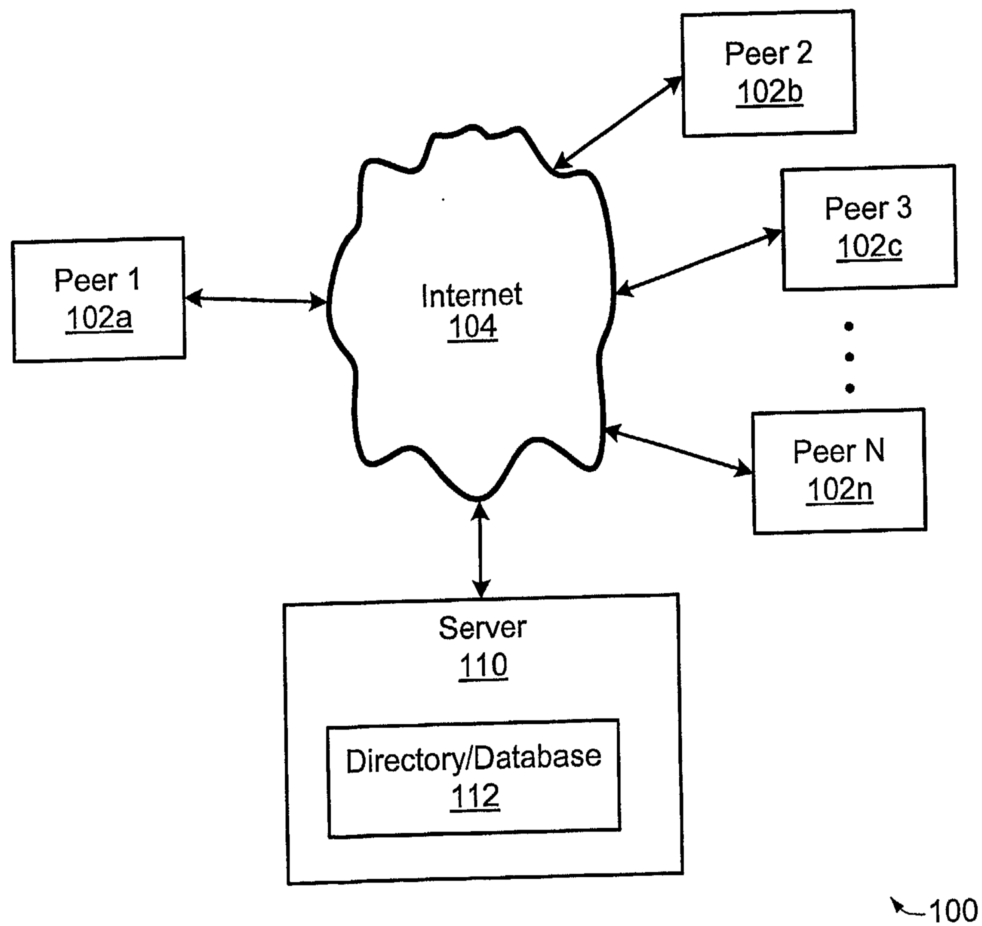


Peer 1
102a
Internet
104
Peer 2
102b
Peer 3
102c
Peer N
102n
Server
110
Directory/Database
112
100

Fig. 1

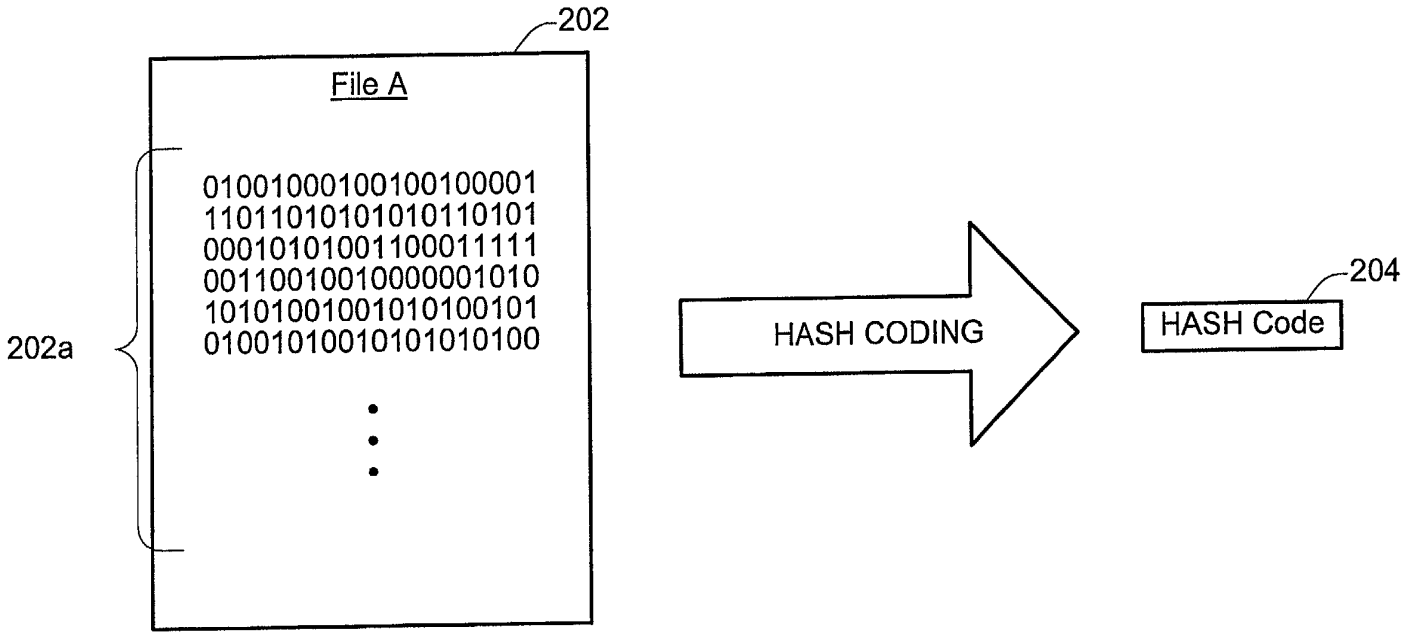

202
File A
01001000100100100001
11011010101010110101
00010101001100011111
00110010010000001010
10101001001010100101
01001010010101010100
202a
HASH CODING
204
HASH Code

Fig. 2

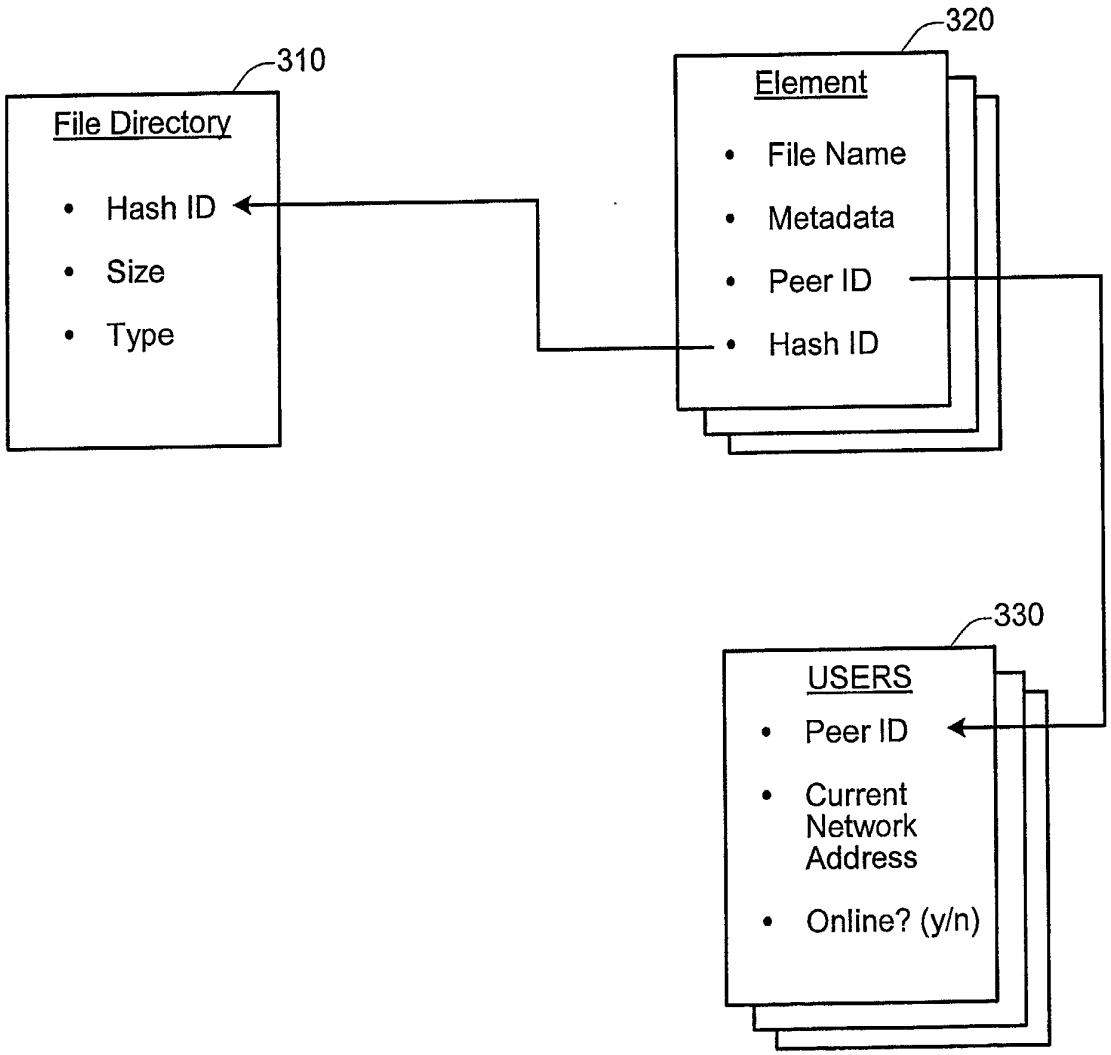


Fig. 3A

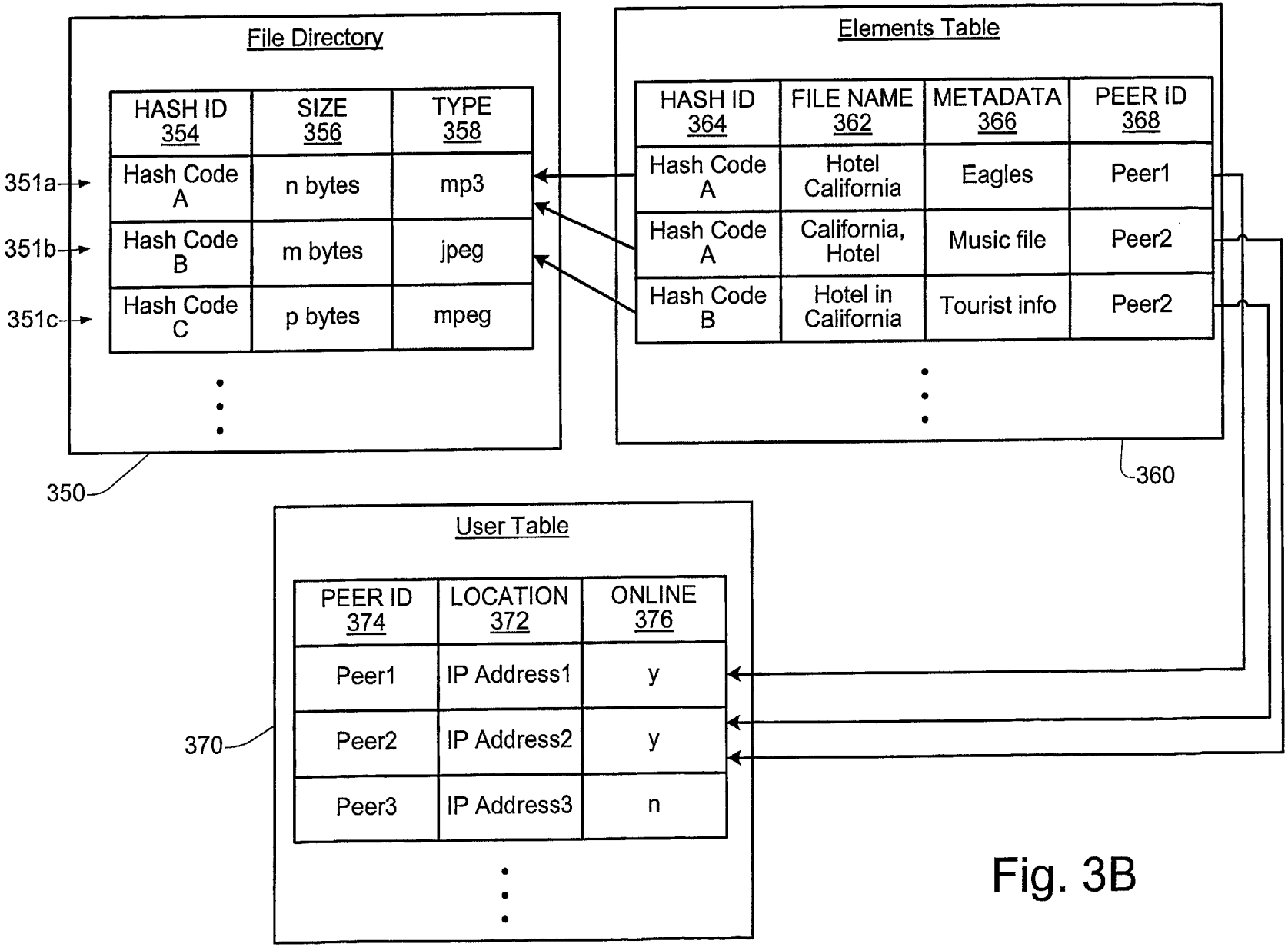

File Directory
HASH ID 354
SIZE 356
TYPE 358
351a
Hash Code A
n bytes
mp3
351b
Hash Code B
m bytes
jpeg
351c
Hash Code C
p bytes
mpeg
350
Elements Table
HASH ID 364
FILE NAME 362
METADATA 366
PEER ID 368
Hash Code A
Hotel California
Eagles
Peer1
Hash Code A
California, Hotel
Music file
Peer2
Hash Code B
Hotel in California
Tourist info
Peer2
360
User Table
PEER ID 374
LOCATION 372
ONLINE 376
Peer1
IP Address1
y
Peer2
IP Address2
y
Peer3
IP Address3
n
370

Fig. 3B

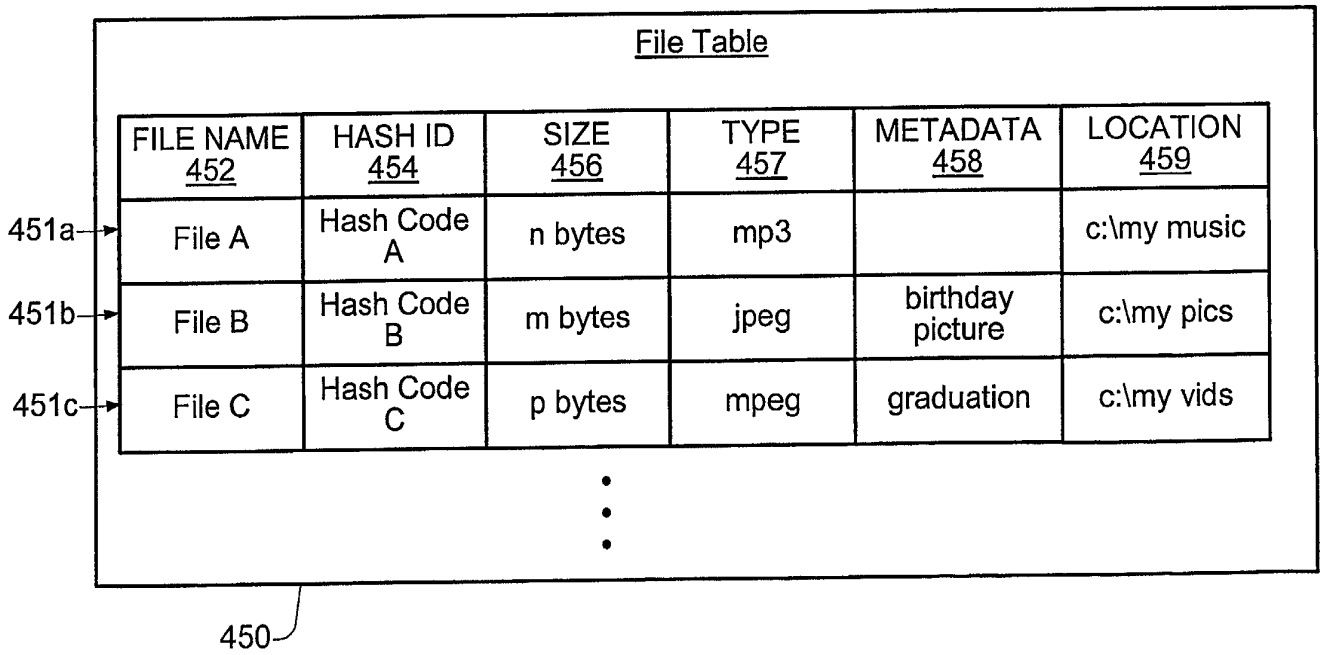


Fig. 4A

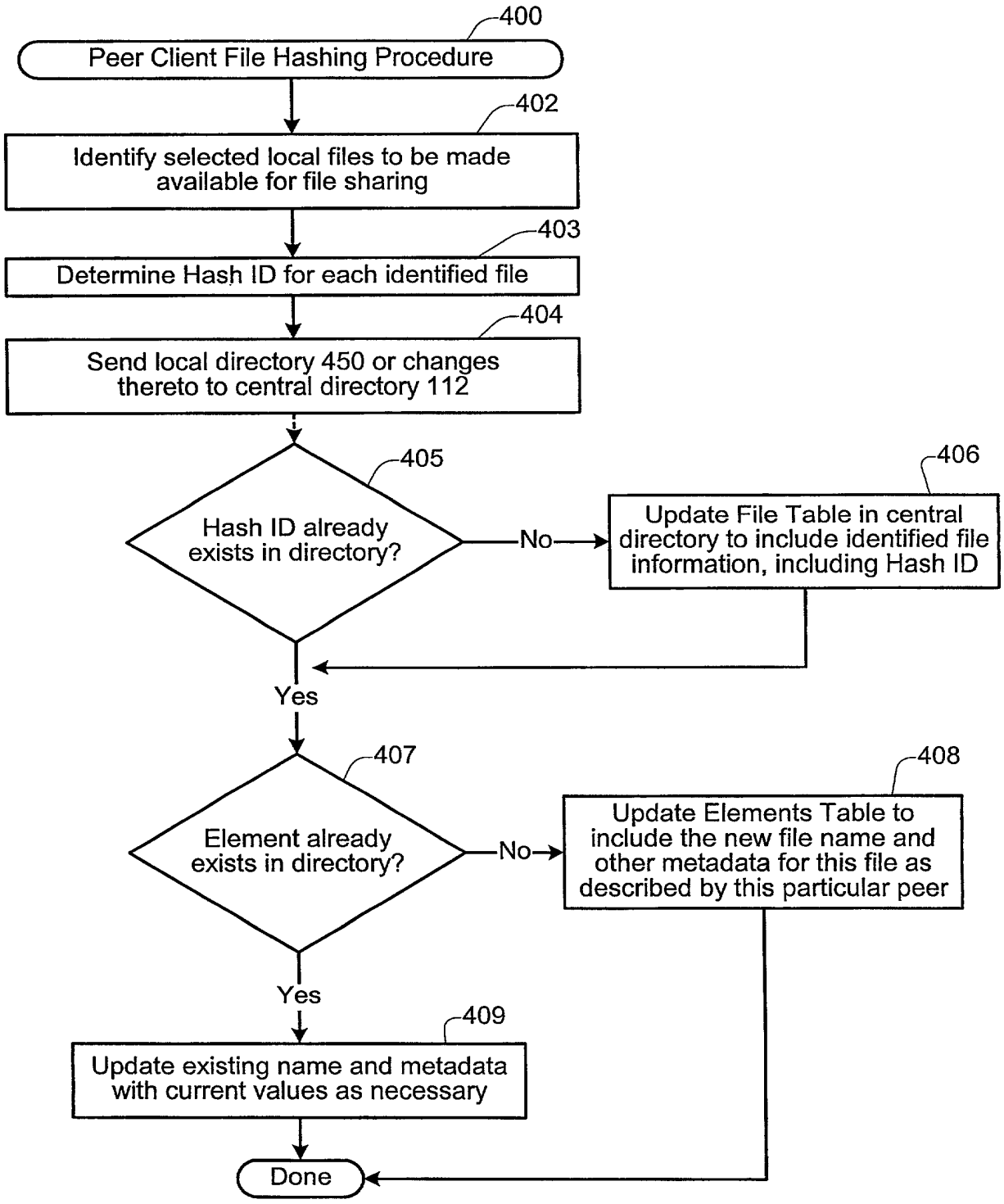

400
Peer Client File Hashing Procedure
402
Identify selected local files to be made available for file sharing
403
Determine Hash ID for each identified file
404
Send local directory 450 or changes thereto to central directory 112
405
Hash ID already exists in directory?
No
406
Update File Table in central directory to include identified file information, including Hash ID
Yes
407
Element already exists in directory?
No
408
Update Elements Table to include the new file name and other metadata for this file as described by this particular peer
Yes
409
Update existing name and metadata with current values as necessary
Done

Fig. 4B

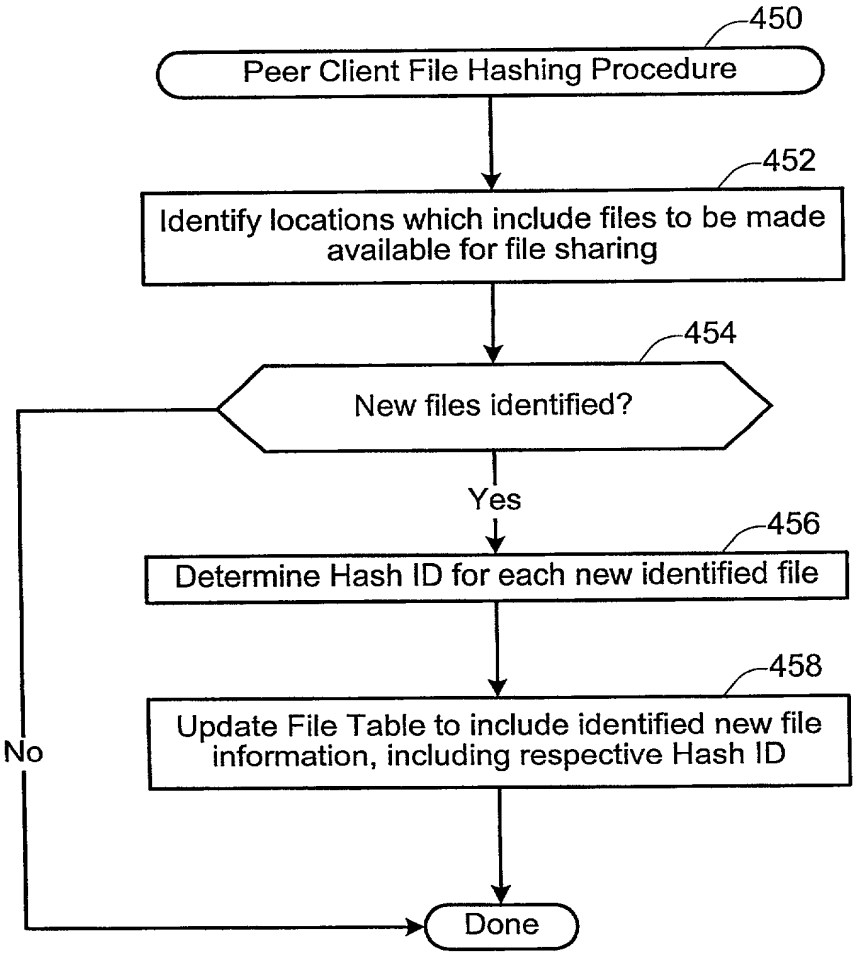

450
Peer Client File Hashing Procedure
452
Identify locations which include files to be made available for file sharing
454
New files identified?
Yes
No
456
Determine Hash ID for each new identified file
458
Update File Table to include identified new file information, including respective Hash ID
Done

Fig. 4C

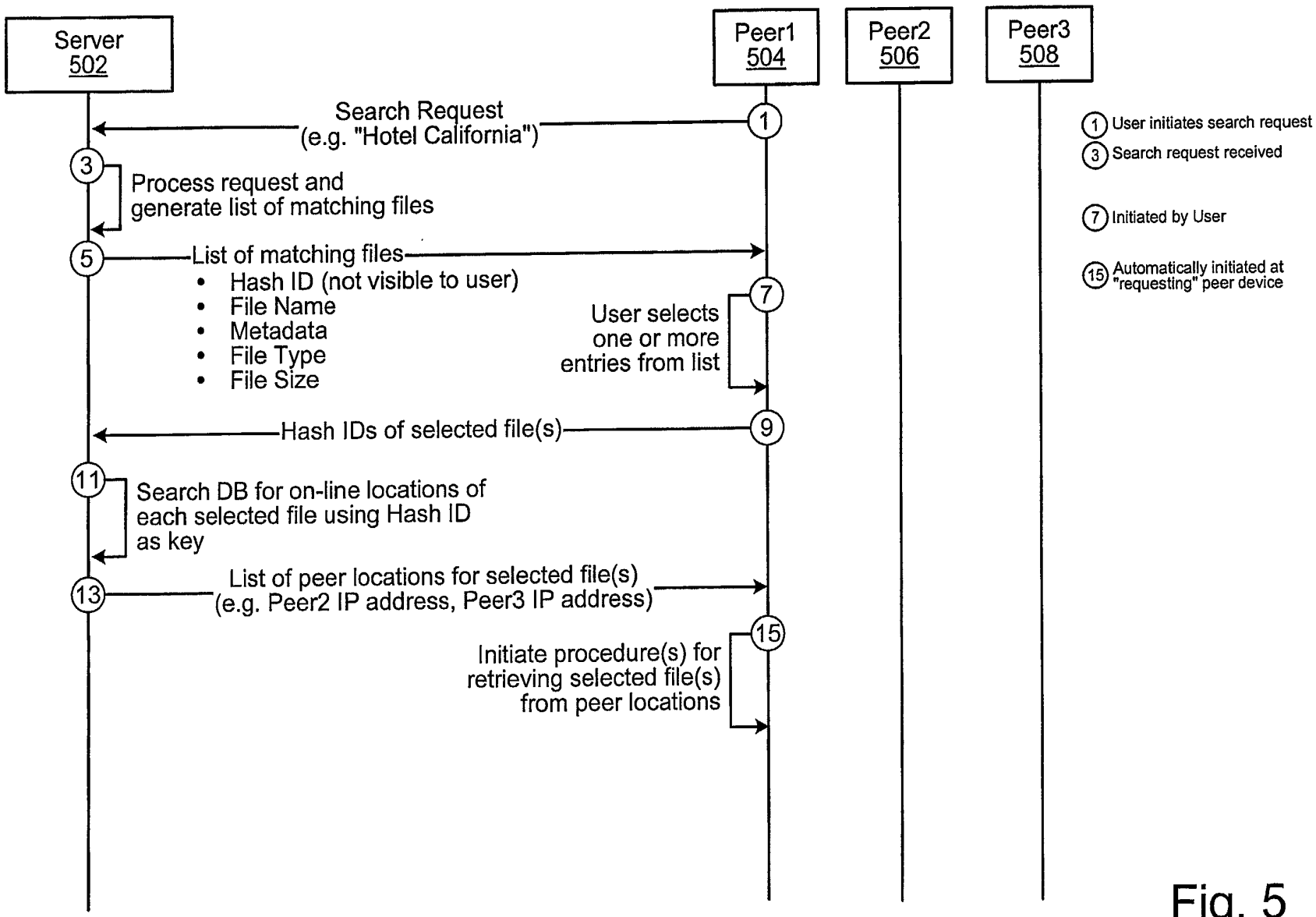

Server
502
Peer1
504
Peer2
506
Peer3
508
Search Request
(e.g. "Hotel California")
1
3
Process request and
generate list of matching files
5
List of matching files
• Hash ID (not visible to user)
• File Name
• Metadata
• File Type
• File Size
7
User selects
one or more
entries from list
Hash IDs of selected file(s)
9
11
Search DB for on-line locations of
each selected file using Hash ID
as key
13
List of peer locations for selected file(s)
(e.g. Peer2 IP address, Peer3 IP address)
15
Initiate procedure(s) for
retrieving selected file(s)
from peer locations
1 User initiates search request
3 Search request received
7 Initiated by User
15 Automatically initiated at
"requesting" peer device

Fig. 5

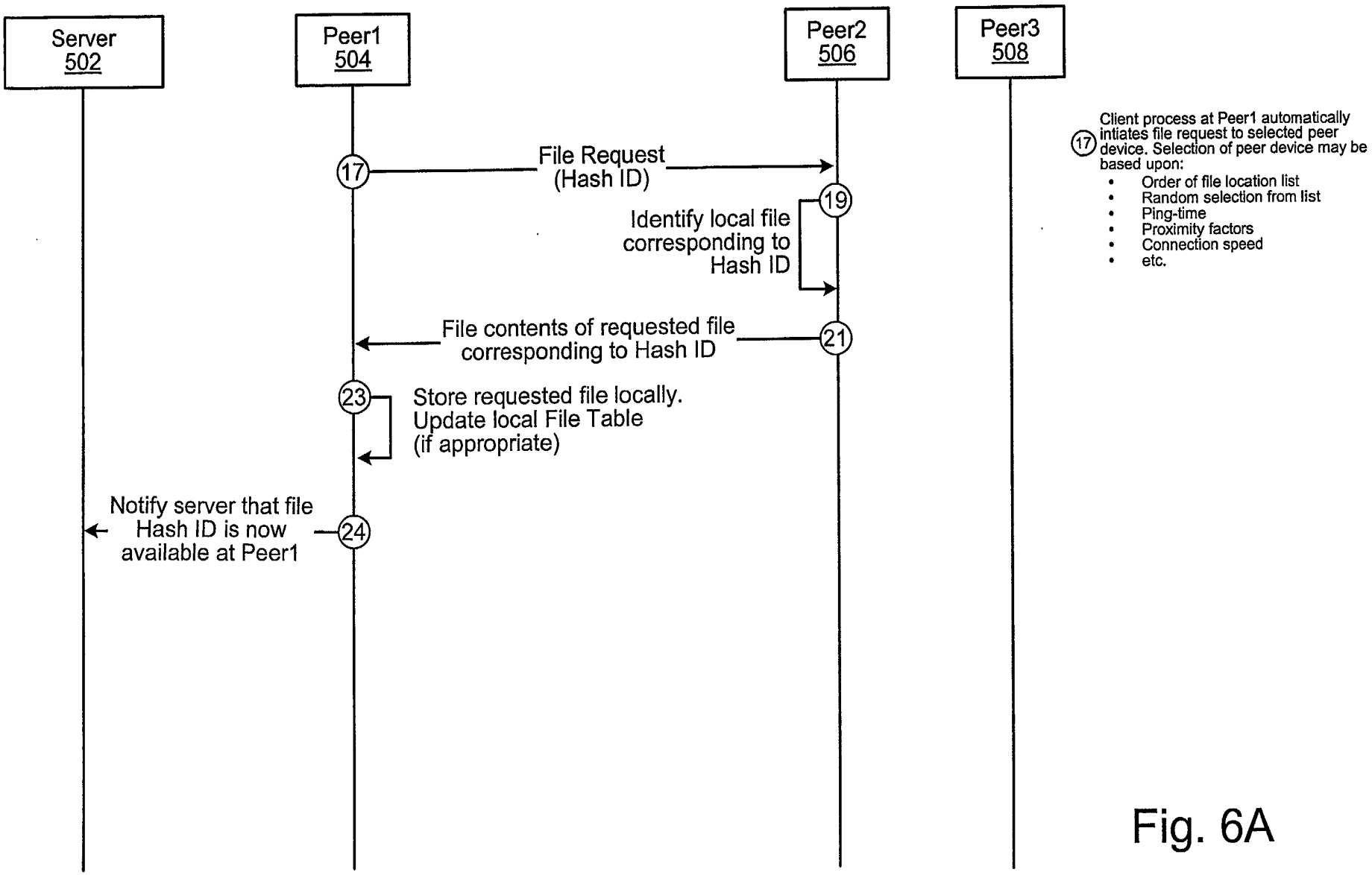


Fig. 6A

Round-Robin Embodiment

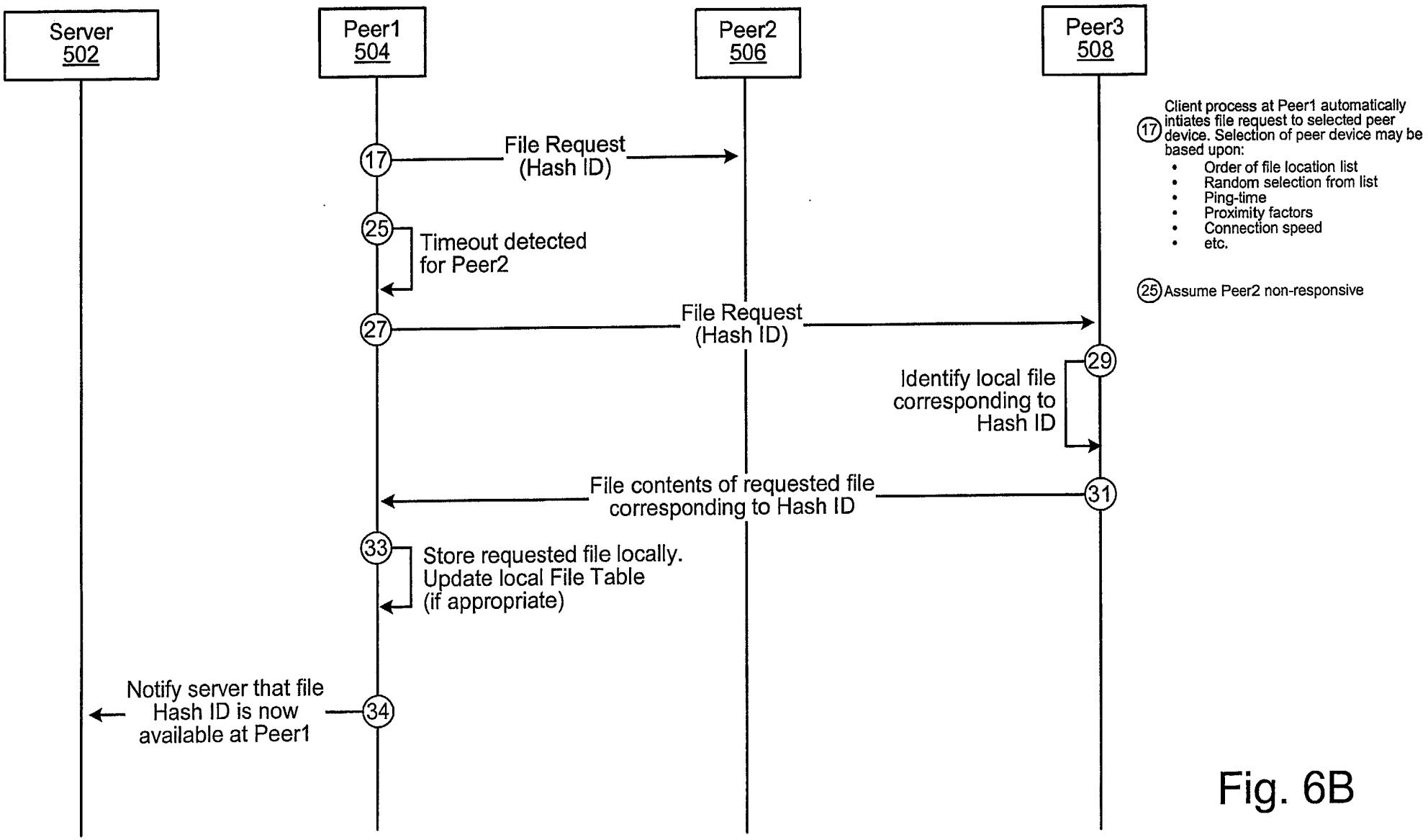


Fig. 6B

Round-Robin Embodiment

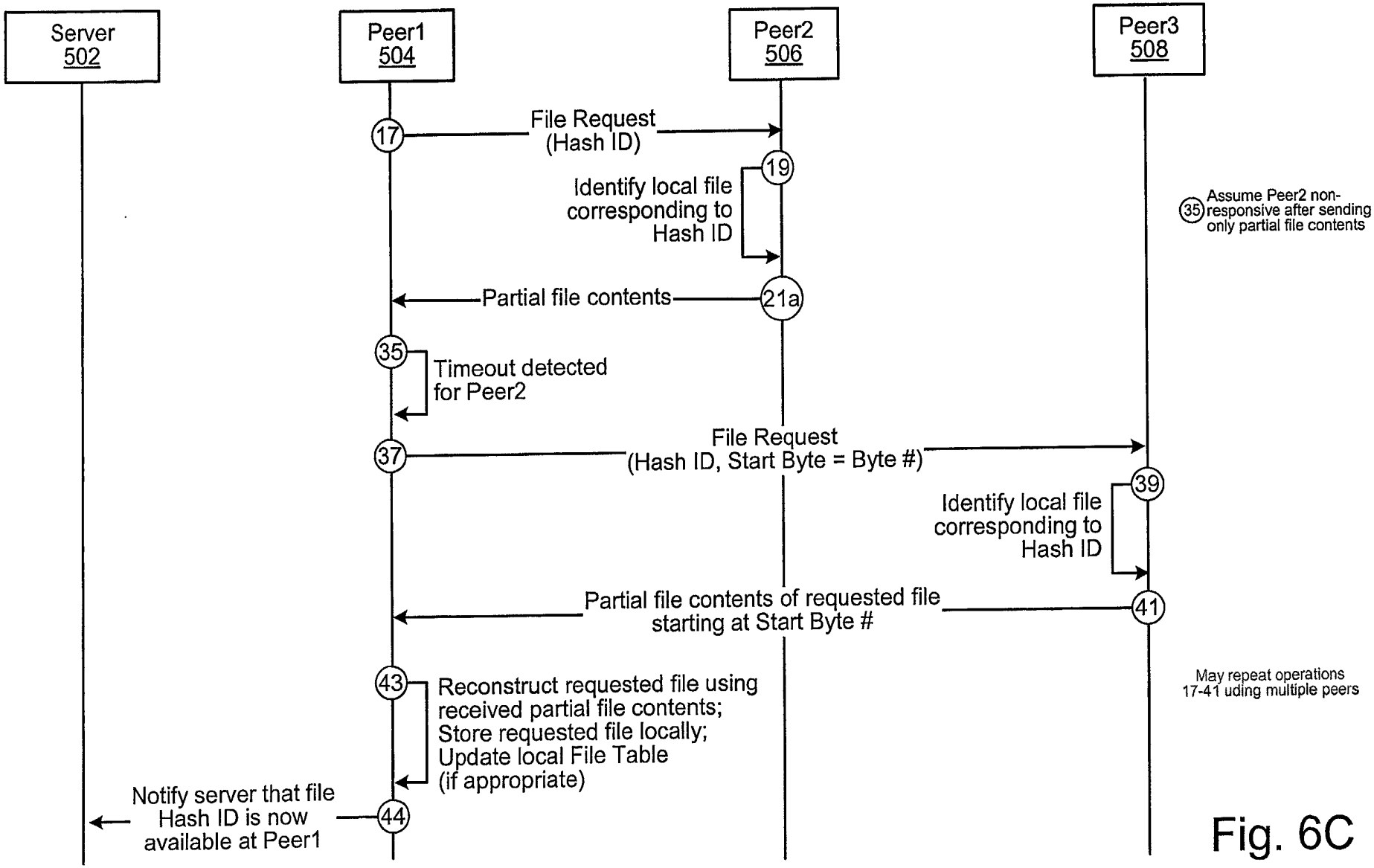


Fig. 6C

Round-Robin Embodiment

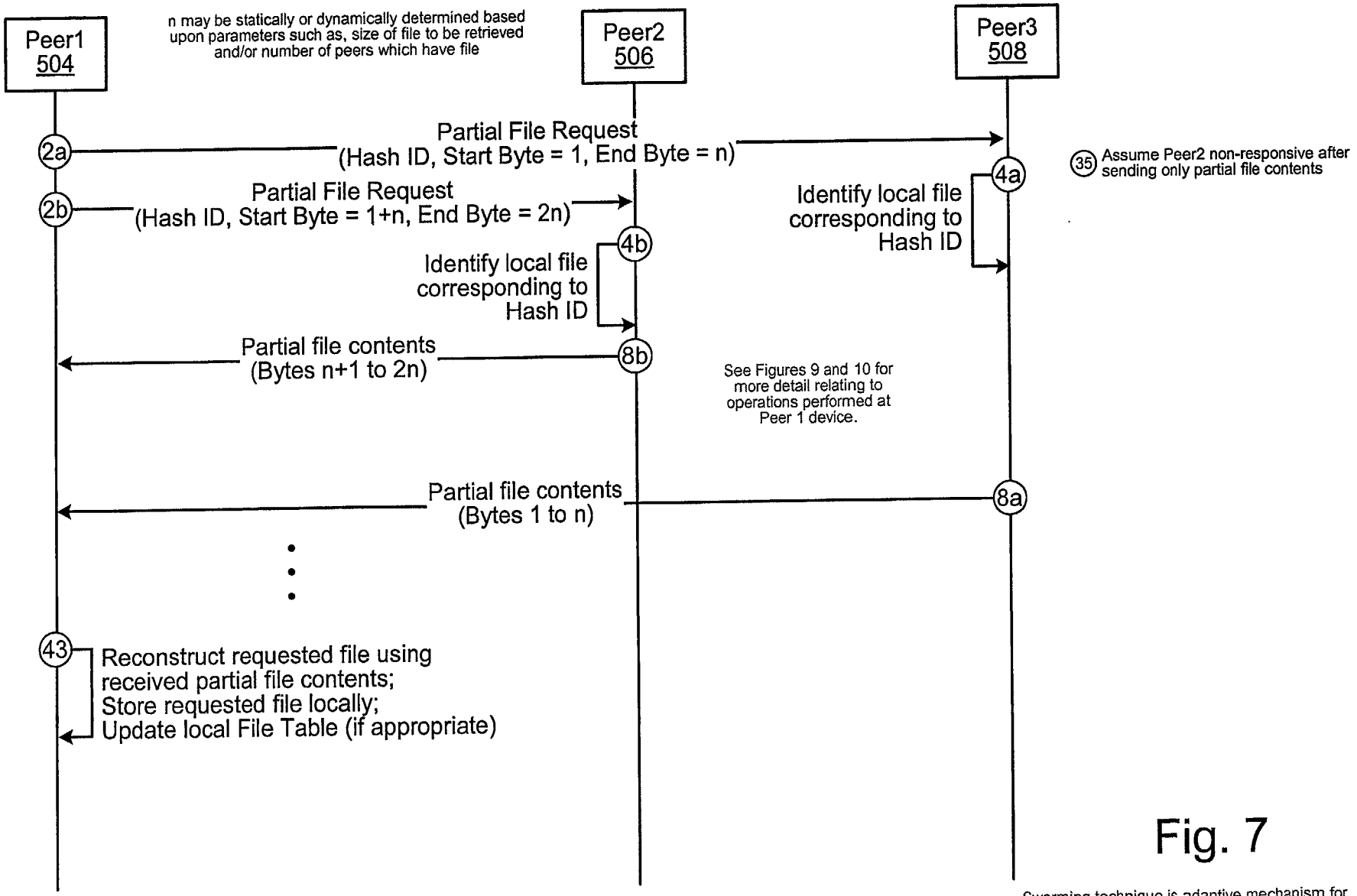
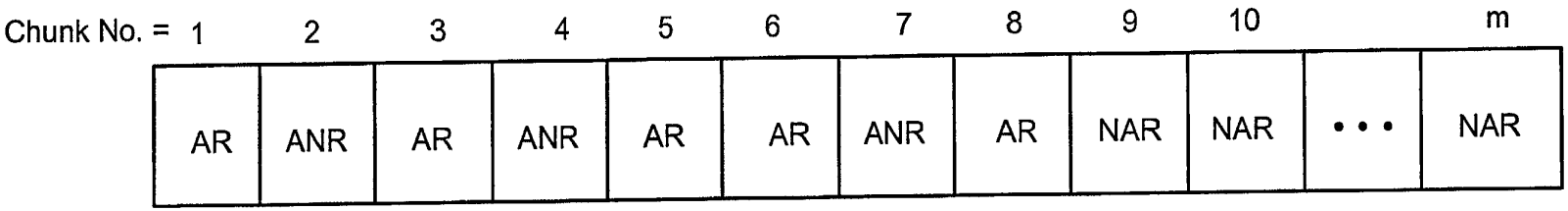


Fig. 7

Swarming technique is adaptive mechanism for balancing workload across multiple peers.



AR = Assigned and Retrieved

ANR = Assigned and Not Retrieved

NAR = Not Assigned and Not Retrieved

800

Fig. 8

Chunk Map for desired file.
Maintained by Chunk Manager.

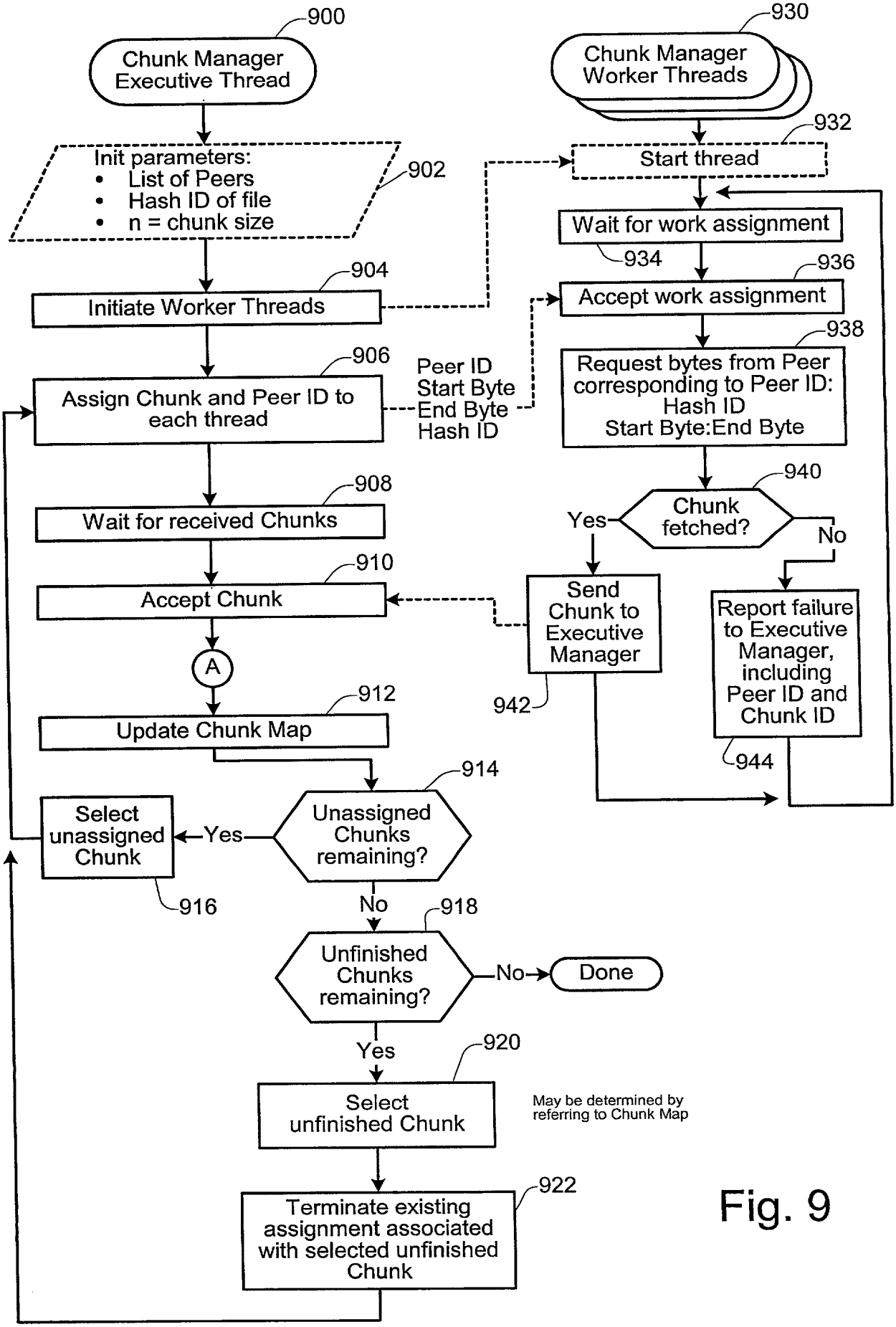

900
Chunk Manager Executive Thread
Init parameters:
• List of Peers
• Hash ID of file
• n = chunk size
902
904
Initiate Worker Threads
906
Assign Chunk and Peer ID to each thread
Peer ID
Start Byte
End Byte
Hash ID
908
Wait for received Chunks
910
Accept Chunk
A
912
Update Chunk Map
914
Unassigned Chunks remaining?
Yes
Select unassigned Chunk
916
No
918
Unfinished Chunks remaining?
No
Done
Yes
920
Select unfinished Chunk
May be determined by referring to Chunk Map
922
Terminate existing assignment associated with selected unfinished Chunk
930
Chunk Manager Worker Threads
932
Start thread
Wait for work assignment
934
936
Accept work assignment
938
Request bytes from Peer corresponding to Peer ID:
Hash ID
Start Byte:End Byte
940
Chunk fetched?
Yes
No
Send Chunk to Executive Manager
942
Report failure to Executive Manager, including Peer ID and Chunk ID
944

Fig. 9

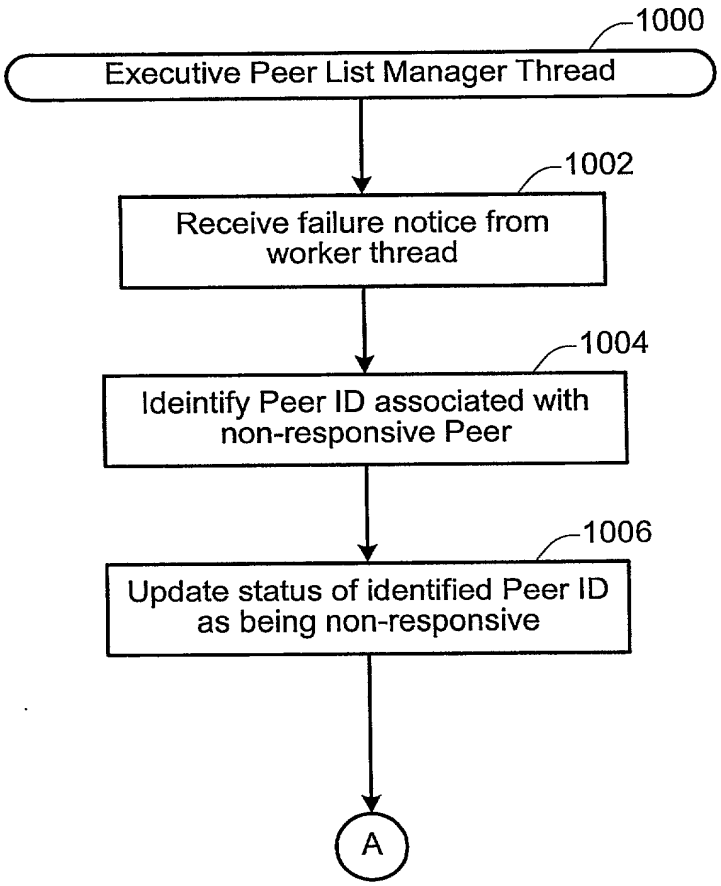

1000
Executive Peer List Manager Thread
1002
Receive failure notice from worker thread
1004
Ideintify Peer ID associated with non-responsive Peer
1006
Update status of identified Peer ID as being non-responsive
A

Fig. 10

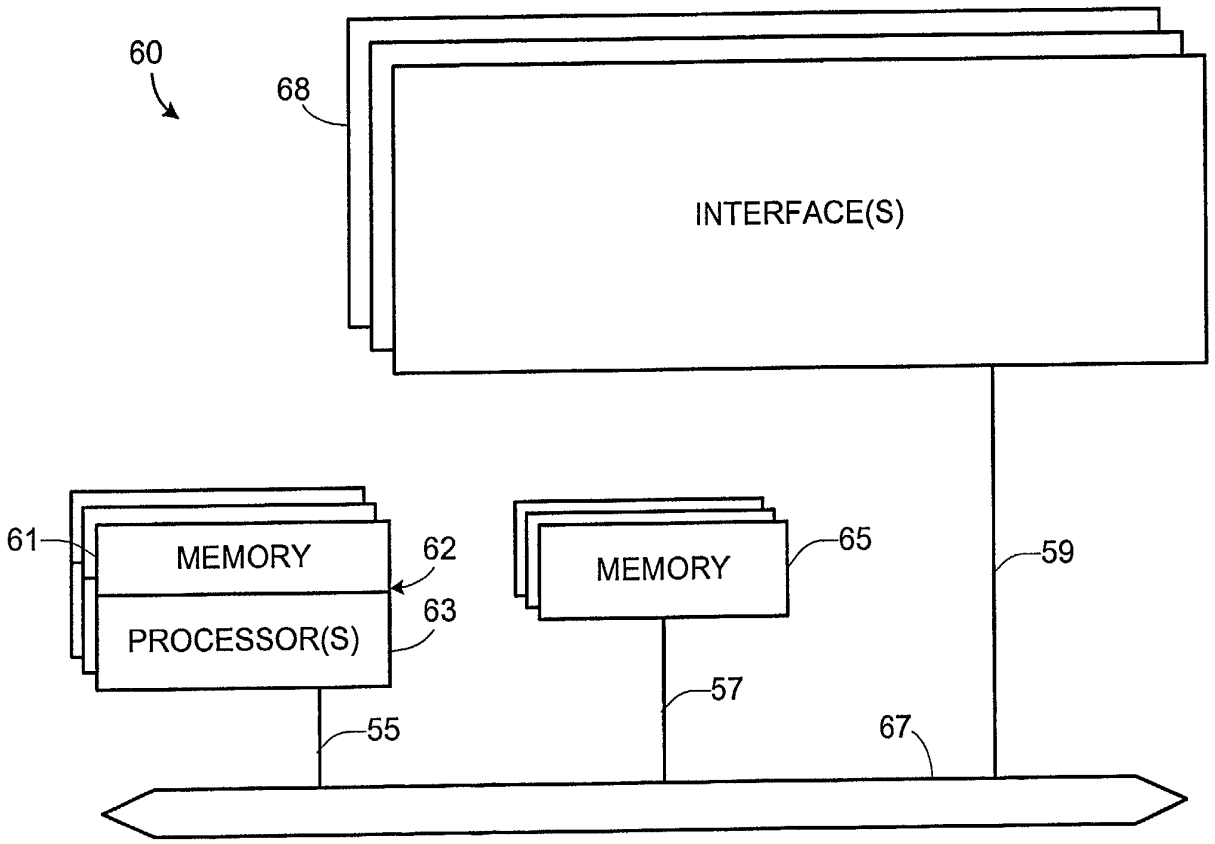

60
68
INTERFACE(S)
61
MEMORY
62
63
PROCESSOR(S)
65
MEMORY
59
57
55
67

Figure 11

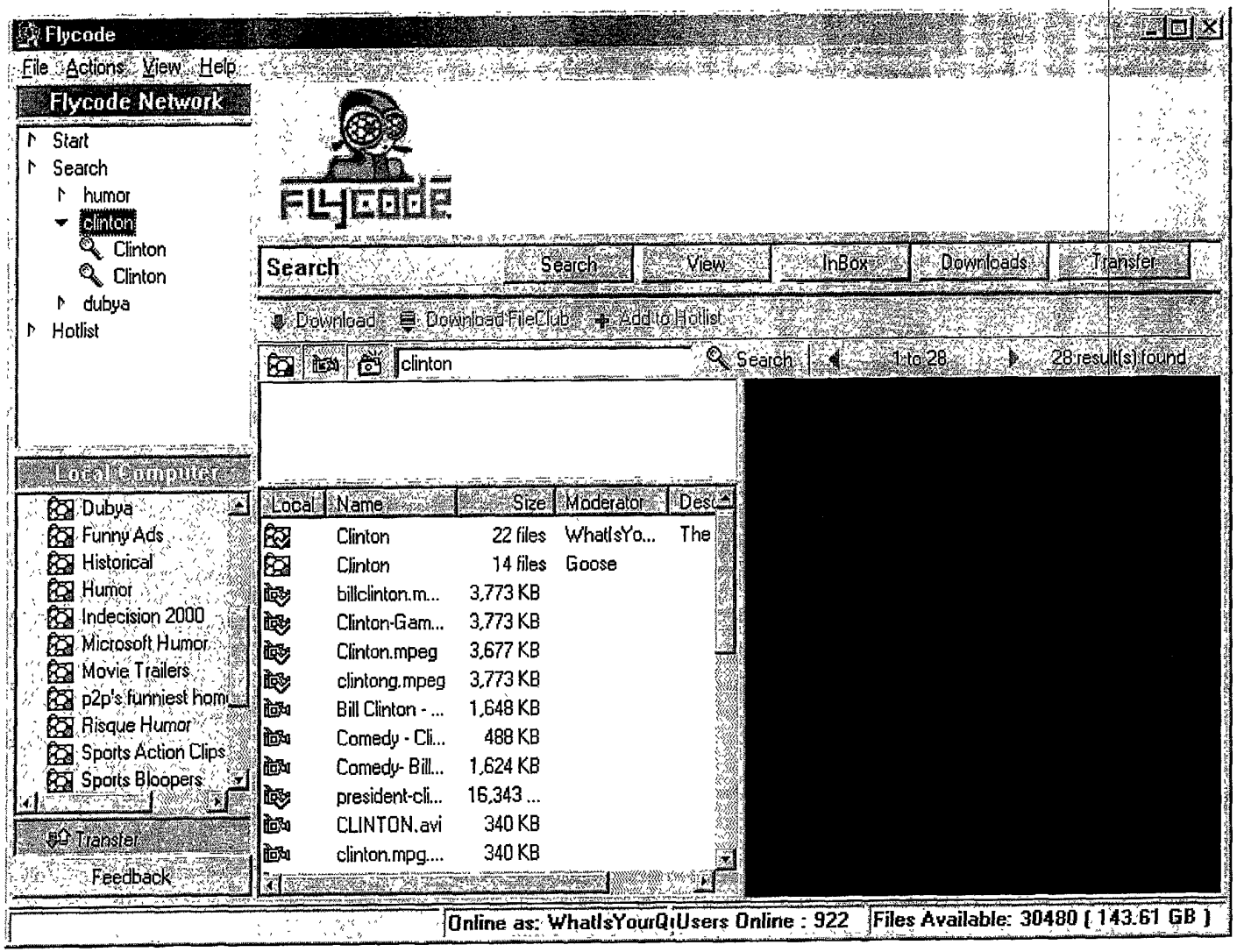


Fig. 12

1200

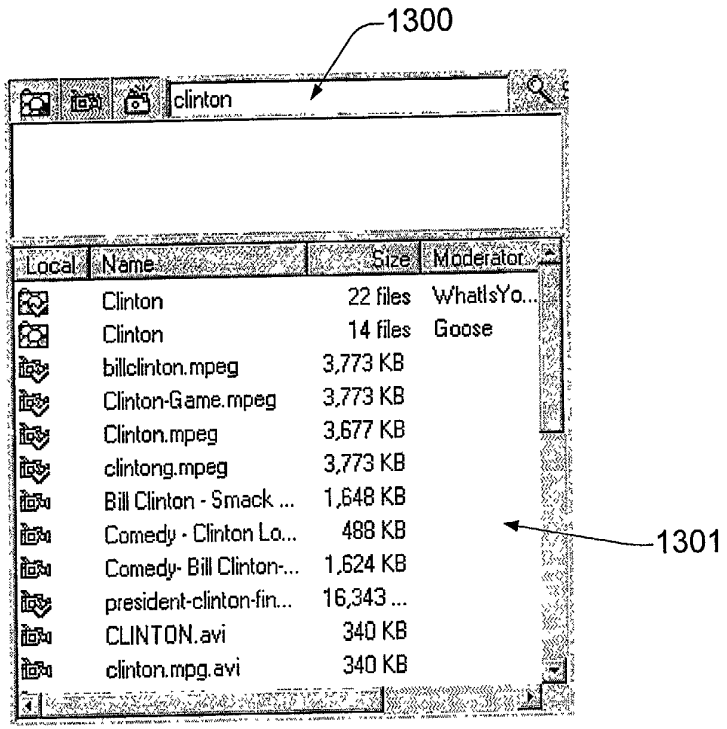


Fig. 13

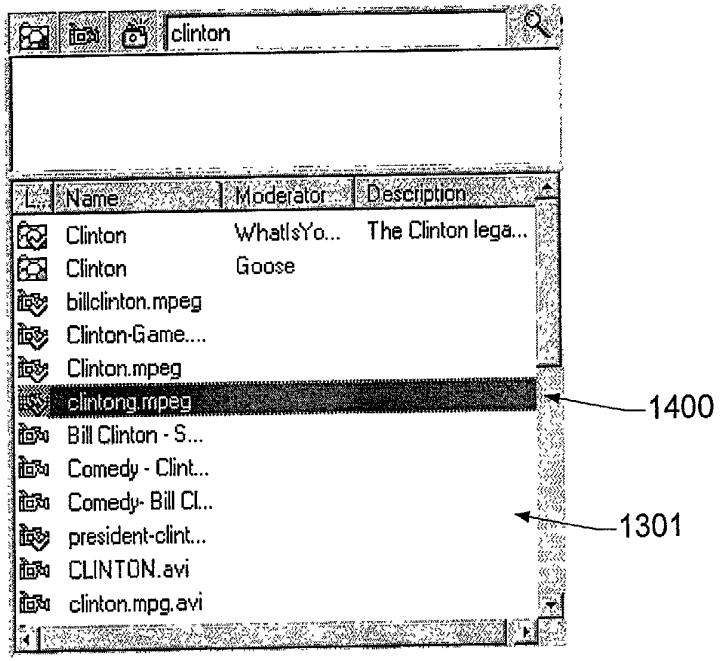


Fig. 14